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(56) Documents Cited

US 5174318 A US 4221547 A US 3963046 A

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(54) Dishwasher with damping devices to reduce motor noise

(57) A domestic dishwashing machine is provided with a sump (2, Fig. 2) fitted at the underside to the tub, a recirculating and/or washing pump and at least one base or support means for said pump which is formed by an impeller 14 internal to said sump, a motor 5 external to the sump and associated with said support means 3, and by a shaft for transmission of the movement of the motor to the impeller, which motor is at least partially elastically insulated with respect to said structure. Preferably the transmission shaft is formed by two coaxial separate portions wherein a first portion 6 is connected to the impeller and the other portion 7 is connected to the rotor of the motor, said portions being connected by an elastic joint which is formed for example by a hollow elastic sleeve 8. The motor may be mounted by means of an elastic plate or ring 11 or elastic elements 17.

Fig.3.

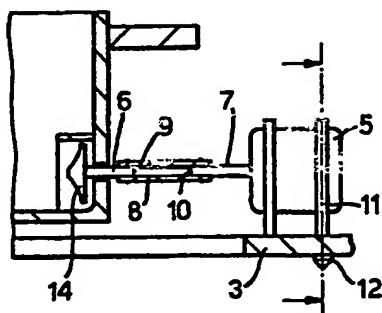
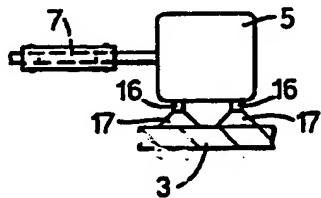


Fig.5.



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Fig.1.

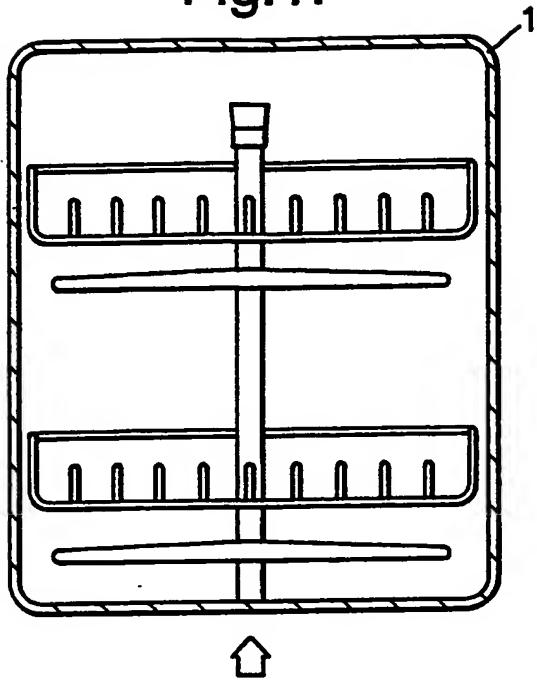


Fig.2.

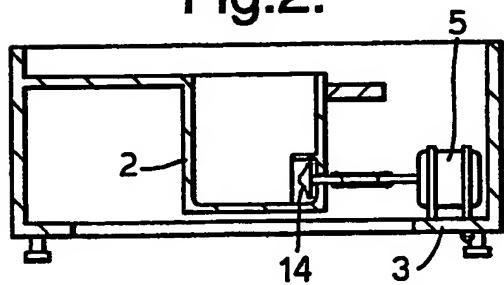


Fig.3.

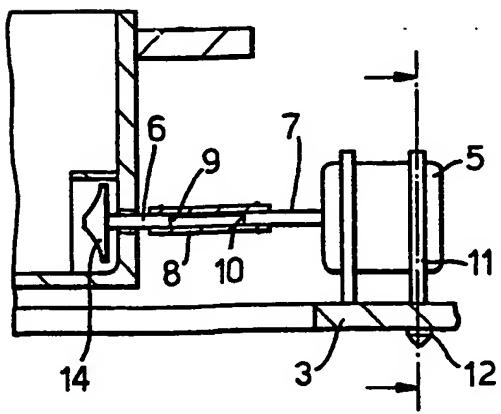


Fig.5.

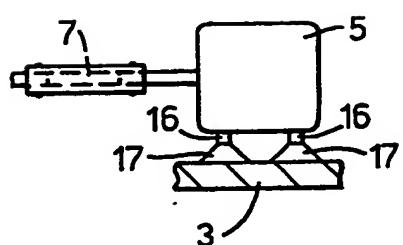
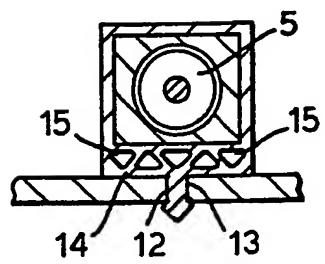


Fig.4.



DISHWASHING MACHINE WITH IMPROVED DAMPING DEVICES

5 The invention concerns a dishwashing machine, in particular for domestic use, provided with particular devices for damping the vibrations which are generated and transmitted by the motor of the recirculating pump.

Domestic dishwashing machines are known, which are provided with a washing tub whose lower portion is closed by a separate component, generally known as a "sump".

10 The functions of such a sump are in particular to accommodate the filters for the washing liquid, the impellers of the pumps used for recirculation and drainage, and the portion of the recirculation conduit which supports the lower spray arm and feeds it with liquid which is pumped
15 by the recirculation pump.

Recent technological developments have been such as to bring about the result that the recirculation and drainage pumps have been combined in a single pump and for the sake of simplicity hereinafter in this patent reference 20 will be made to that single pump, but it will still be appreciated that the invention is applied independently to both said pumps and associated impellers in the case of dishwashing machines which are equipped with both said pumps.

25 Having regard to the structural complexity of such a sump, it is thus usefully made as a separate component, generally of plastics material, and only subsequently associated in stable and sealing relationship with the bottom of the tub in order to form therewith a single sealed
30 assembly.

That type of construction can be produced with very many alternative configurations according to the structural and functional requirements, and is generally satisfactory.

However it suffers a disadvantage which hitherto has not been effectively overcome: in fact the presence of the impeller of the pump within the sump gives rise to troublesome noise which can be attributed to two causes:

5 the first cause is due to the fact that the transmission shaft for transmitting the movement of the motor of the pump, which is external to the sump, to the pump impeller which is internal to the sump, has to pass through a suitable hole, which naturally affords sealing integrity,
10 provided in the wall of the sump.

The consequence of this is that the vibration and noise induced by the motor on the shaft are transmitted to the sump which, being of rigid material and of concave shape, behaves like a soundbox in retransmitting the noise
15 within the tub and from there generally to the entire machine.

The second cause is due to the fact that the motor is normally fixed directly or indirectly on the base of the machine, and thus this involves the similar phenomenon that
20 the vibration and noise generated by the motor are transmitted to the entire machine by way of the base.

It would therefore be desirable, and this is the aim of the present invention, to be able to provide a dishwashing machine having a pump and associated mounting accessories which are capable of avoiding all the above-mentioned disadvantages, and that this construction can be carried into effect in a simple, reliable and economic manner with the current technology.

According to the present invention, there is provided a dishwashing machine, provided with a tub, a pump for recirculation and/or drainage, a structure comprising a sump mounted at the underside to said tub, and at least one support means or base for said pump, the pump being formed by an impeller internal to said sump, by a motor external to the sump and associated with said support means or base, and

by a shaft for transmission of the movement from said motor to said impeller, wherein said motor is at least partially insulated elastically with respect to said structure.

5 The invention will be better appreciated from the following description given solely by way of non-limiting example and with reference to the accompanying drawings in which:

10 Figures 1 and 2 are front views in section respectively showing the tub and base of a domestic dishwashing machine according to the invention;

Figure 3 shows a detail from Figure 2 on an enlarged scale;

15 Figure 4 is a view in cross-section of a detail from Figure 2; and

Figure 5 shows an alternative form of the detail shown in Figure 3.

20 Referring to Figures 1 and 2, shown therein is a domestic dishwashing machine provided with a tub 1, a lower sump 2 which is applied in sealing relationship against the lower part of the tub, and a recirculation or drainage pump formed by an impeller 14 internal to said sump and a motor 5 disposed on the outside thereof.

25 The motor is stably disposed on a base of the dishwashing machine and in any case on a suitable support means 3. In accordance with the state of the art the transmission shaft which connects the motor to the impeller is a continuous element and rotates within suitable sealing and rotary sliding elements in a hole provided in the wall of the sump.

30 The invention essentially involves providing the motor with complete insulation between the parts thereof which are in contact with the elements of the external structure and said elements, so that the noise and vibration transmitted by said parts of the motor are effectively and virtually totally blocked. For that purpose the shaft of

the motor is broken down into two coaxial separate portions of which a first portion 6 is connected to the impeller, passing through a hole provided in the wall of the sump, and a second portion 7 is connected to the rotor of the motor.

5 Those portions are then connected together by means of an elastic joint and in particular with reference to the Figures that joint is formed by an internally hollow sleeve 8, in the hollow terminal portions of which are fitted and blocked the oppositely disposed ends 9,10 of the
10 respective first and second portions 6 and 7.

As regards insulation between the motor and its support means or structure 3, that is achieved by interposing suitable elastic elements; it is found that a particularly effective elastic element which is easy to use
15 is formed by at least one plate or ring 11 composed of elastic material, preferably an elastomer, which fits around the motor and is mounted by per se known means to the support means 3; advantageously the at least one ring 11 is provided in this region of contact with the support means 3
20 with a projection 12 capable of latchingly engaging into a suitable through hole 13 provided in the support means in the region of contact with the ring element.

It has been noted that the damping effect is enhanced if the portion of said plate or ring interposed as
25 indicated at 14 between the motor and the support means has a plurality of through holes or openings 15.

A useful and economical alternative to the plate or ring is afforded by interposing a plurality of elastic elements 17 between the support means 3 and a respective
30 plurality of blocks 16 supporting the motor.

CLAIMS

1. A dishwashing machine, provided with a tub, a pump for recirculation and/or drainage, a structure comprising a sump mounted at the underside to said tub, and at least one support means or base for said pump, the pump being formed by an impeller internal to said sump, by a motor external to the sump and associated with said support means or base, and by a shaft for transmission of the movement from said motor to said impeller, wherein said motor is at least partially insulated elastically with respect to said structure.
5
2. A dishwashing machine according to claim 1 wherein said motion transmission shaft is formed by two coaxial separate portions, a first one of the portions being connected to said impeller and the other portion being connected to the rotor of the motor, the zone of separation between said first and second portions being disposed on the outside of the sump, and an elastic joint connects said portions.
15
3. A dishwashing machine according to claim 2, wherein said elastic joint is formed by an internally hollow sleeve and the oppositely disposed ends of said respective first and second portions are accommodated and blocked in the hollow terminal portions of said sleeve.
25
4. A dishwashing machine according to claim 1, 2 or 3, wherein said motor is connected to said support means by way of at least one plate element which is disposed around said motor and fitted to said support means, said plate element being elastic.
30

5. A dishwashing machine according to claim 4,
wherein said plate element is provided with a projection
disposed externally to same and capable of being inserted
and being automatically locked in latching engagement in a
5 suitable through hole provided in said support means in the
portion involving contact between said plate element and
said support means.

10 6. A dishwashing machine according to claim 4 or
claim 5 wherein the portion of said plate element which is
interposed between the motor and said support means has a
plurality of through holes or openings adapted to enhance
the elastic insulation of said motor with respect to said
support means.

15 7. A dishwashing machine according to any one of the
preceding claims, wherein a plurality of support legs is
associated with said motor and that a plurality of elastic
elements is respectively interposed between said support
20 means and said respective legs.

25 8. A dishwashing machine constructed and arranged to
operate substantially as hereinbefore described with
reference to and as illustrated in the accompanying
drawings.



The
Patent
Office

Application No: GB 9514045.5
Claims searched: 1-8

Examiner: A C Howard
Date of search: 30 August 1995

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.N): A4F

Int Cl (Ed.6): A47L 15/42

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	US 5174318 DINGLER <i>et al</i> (see col. 4 lines 57-61)	1
X	US 4221547 HOFFMAN <i>et al</i> (whole document relevant)	1
X	US 3963046 BERGESON (see the Abstract; col 3 lines 38-47)	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.